forming said adjacent word lines from conductive material so that each of said adjacent word lines is directly connected to said gates of adjacent memory cells of said three adjacent columns and so that each word line has side walls;

forming a first oxide layer that has a first dielectric constant to a first thickness and to be in contact with said adjacent word lines and to be disposed between said adjacent word lines;

forming a second oxide layer including tetramethylsilane (TMS) based silicon dioxide having a second dielectric constant that is lower than said first dielectric constant to a second thickness and to be in contact with said first silicon dioxide and so that said TMS based silicon dioxide is also disposed between the side walls of said adjacent word lines.

16. (Deleted) The process as defined in claim 15, wherein the dielectric constant of said first oxide dielectric layer is higher than the dielectric constant of said TMS oxide dielectric layer.

17. (Unchanged) The process as defined in claim 15, wherein said the second thickness of said TMS based oxide is thicker than the first thickness of said first oxide layer.

REMARKS

Claims 1-17 are examined, claims 1-14 are allowed, claim 15 and 17 are rejected, and claim 16 is objected to. Reexamination and reconsideration is requested. Claims 1-17 are pending in the application. Claims 15 is amended. Claim 16 is deleted. Claim 17 in unchanged.

The amendments that were made to the claims were made to overcome objection of the Examiner made under 35 USC § 103(a). Other amendments to the claims were made so that the terms in the claims will have the proper antecedents, and so that the invention is properly claimed and to avoid confusion.

Formal drawings were submitted in the past.

I. Claim Rejection 35 U.S.C. § 103(a).

The Federal Circuit decided in *In re Rouffet, 149 F.3d 1350, 47 USPQ2d 1453, 1455 (Fed. Cir. 1998)*, that:

> "To reject claims in an application under section 103, an examiner must show an unrebutted *prima facie* case of obviousness. See *In re Deuel*, 51 F.3d 1552, 1557, 34 USPQ2d 1210, 1214 (Fed. Cir. 1995). In the absence of a proper *prima facie* case of obviousness, an applicant who complies with the other statuary requirements is entitled to a patent. See *In re Oetinker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992).".

Claims 15 and 17 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Gill et al., U.S. Patent No. 5,120,571 ("Gill '571") in view of Okano at al., U.S. Patent No. 5,458.919 ("Okano '919").

The Examiner alleges the following:

> "Gill at al. shows the invention substantially as claimed including forming word lines 13 from conducting material; forming a first oxide layer 14 that has a first dielectric constant to a first thickness and to be in contact with the word lines and to be disposed between the word lines; and forming a second oxide layer 14 that has a second dielectric layer and disposed between said word lines (see fig. 4D and col. 6-line 54 to col. 7-line 4).".

Applicant respectfully traverses the Examiner's argument. All the oxide layers in Gill '571 patent have a dielectric constant that is either that of thermally grown silicon dioxide by oxidation of silicon or the layers have dielectric constant that are higher than the dielectric constant of thermally grown silicon dioxide by oxidation. If any of the oxides that are considered

The word "dielectric" does not appear in Okano et al. specification, title, abstract and claims of the patent. There is no information in Okano et al. to teach one of ordinary-skill-in-the-art to know the dielectric constant of the TMS oxide of Okano et al.. Okano at al. also discloses that his instrument can produce silicon nitride film (col. 10, lines 1 to 7) without disclosing the value of the dielectric constant of TMS based silicon nitride. If one speculates, one may attempt to use the Okano et al. silicon nitride that is TMS based because it may have a lower dielectric constant than that of thermal silicon dioxide. But one cannot know anything about the dielectric constant of the Okano et al. thin films that are produced by his instrument from Okano et al. '919 patent disclosure.

In fact Okano at al., col. 10, lines 35 to 36 teaches that **"a desired resistance could not**

be attained from the side wall.", of the Okano at al. TMS based oxide. This communicates to one of ordinary skill in the art that the Okano at al. TMS based oxide is not a good insulator that has high resistance if used in a structure that has sidewalls, such as between two conductive word lines. Therefore, Okano at al. '919 patent teaches away form using TMS based oxide between word lines.

II.1. **Suggestion or Motivation to Modify the References (M.P.E.P. § 2143.01).**

III.1.A. **The Alleged Prior-Art Must Suggest the Desirability of The Claimed Invention.**

The Examiner confirmed that "[G]ill et al. fails to expressly disclose forming the oxide layer of TMS.". Gill et al. does not suggest the use of any dielectric material that has a dielectric constant that is lower than the dielectric constant of thermally grown silicon dioxide that results from the reaction of oxygen and silicon. Therefore, Gill at al. does not suggest the desirability of the claimed invention.

II.1.B. **Fact That The Claimed Invention is Within The Capabilities of One of Ordinary Skill in The Art is Not Sufficient By Itself to Establish *Prima Facie* Obviousness.**

"[A] statement that modification of prior art to meet the claimed invention would have been "well within the ordinary skill of the art . . . is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teaching of the references.". *M.P.E.P. § 2143.01 (Citing, Ex parte Levengood, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993).*

The Examiner alleges that:

> "it would have been obvious to one of ordinary skill in the art at

> the time the invention was made to modify the process of Gill et al. so as to form the oxide layer of TMS because this is shown to be suitable precursor to form stable oxide layers.".

The Examiner fails to propose what would motivate one to attempt another arrangement of insulating materials that is not already cited by Gill et al., or what would motivate one to use the Okano et al. TMS oxide with unknown dielectric constant.

Therefore, the Examiner did not show "some objective reason to combine the teaching of" Gill et al. with the disclosure of Okano et al..

II.1.C. The Proposed Modification Cannot Render The Prior Art Unsatisfactory For Its Intended Purpose.

M.P.E.P 2143.01 states:

> "If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification.".

Citing *In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).*

Okano at al., col. 10, lines 35 to 36 teaches that **"a desired resistance could not be attained from the side wall."**, of the Okano at al. TMS based oxide. This communicates to one of ordinary skill in the art that the Okano at al. TMS based oxide is not a good insulator that has high resistance to current conduction if used in a structure between adjacent sidewalls, such as between two conductive word lines in order to prevent current conduction between the word lines. Current conduction between word lines will make the memory array of Gill et al. inoperable. The proposed modification by the Examiner of using the Okano et al. TMS based oxide as a substitute for the oxide 14 of Gill et al., renders the prior art system unsatisfactory for its intended purpose.

II.2. Reasonable Expectation of Success Is Required (M.P.E.P. § 2143.02).

II.2.A. Applicant May Present Evidence Showing There Was No Reasonable Expectation of Success.

"Evidence showing there was no reasonable expectation of success may support a conclusion of non-obviousness.". *M.P.E.P. § 2143.02*, Citing *In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976).*

Okano at al., col. 10, lines 35 to 36 teaches that **"a desired resistance could not be attained from the side wall."**, of the Okano at al. TMS based oxide. This communicates to one of ordinary skill in the art that the Okano at al. TMS based oxide is not a good insulator that has high resistance if used in a structure between adjacent sidewalls, such as between two conductive word lines in order to prevent current conduction between the word lines. Current conduction between word lines will make the memory array of Gill et al. inoperable. The proposed modification by the Examiner of using the Okano et al. TMS based oxide as a substitute for the oxide 14 of Gill et al., renders the prior art system unsatisfactory for its intended purpose.

II.3 All Claim Limitations Must Be Taught or Suggested. (M.P.E.P. § 2143.03).

"[T]o establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.". M.P.E.P. § 2143.03, citing *In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974)*;

The Examiner does not direct us to any evidence of a teaching or suggestion in Gill et al., to select the arrangement of:

> "forming a first oxide layer that has a first dielectric constant to a first thickness and to be in contact with the adjacent word lines and to be disposed between the adjacent word lines;
>
> forming a second oxide layer including tetramethylsilane (TMS) based silicon dioxide having a second dielectric constant that is lower than said first dielectric constant to a second thickness and to be in contact with said first silicon dioxide and so that said TMS based silicon dioxide is also disposed between the side walls of the adjacent word lines.".

To support his contention the Examiner in fact proposes that the single layer of oxide 14 of the Gill et al. process is made up of two layers with two dielectric constants, which is not a true fact from the Gill et al. '571 patent itself. Gill et al., uses the words "an oxide" to states clearly at col. 7, lines 1 to 4, that layer 14 is only one oxide layer: "depositing **an oxide** ….. to form oxide strips 14." (emphasis added).

The federal Circuit decided that such a lack of "any evidence of a teaching or suggestion to select" the claimed insulator precludes the finding of obviousness. See *ATD Corporation v. Lyndall, Inc.,1998 U.S. App. LEXIS 24696, DkFC 97-1308, 48 USPQ2d 1321, 1329 (Fed. Cir. 1998).*

It is clear that all claim limitations of the instant application are not taught nor suggested by combining Gill at al. and Okano et al..

As detailed above I am traversing the Examiner's position regarding the alleged obviousness of claims 15 and 17. Therefore, allowance of these pending claims as amended is courteously requested.

III. CONCLUSION

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Attached hereto is a make-up version of the changes made to the claims in the instant amendment. The attached pages are captioned **VERSION WITH MARKING TO SHOW CHANGES MADE.**

The Examiner's objections were addressed and some of the claims were amended to place the application in a condition for allowance.

Therefore allowance of the pending claims as amended is courteously requested.

Respectfully Submitted

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December 22, 2004
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VERSION WITH MARKING TO SHOW CHANGES MADE.

IN THE CLAIMS

Please make the following amendments:

In claims 15, 16 and 17 delete the words in brackets and insert the underlined words as follows:

15. (Amended) A process for forming a semiconductor memory **cells** array **wherein each cell has a transistor with a gate and said array** having at **least two adjacent** word lines **and at least three adjacent columns of memory cells** in order to obtain reduced capacitance between word lines comprising:

forming said **adjacent** word lines from conductive material **so that each of said adjacent word lines is directly connected to said gates of adjacent memory cells of said three adjacent columns and so that each word line has side walls**;

forming a first oxide layer that has a first dielectric constant to a first thickness and to be in contact with **[the]** **said adjacent** word lines and to be disposed between **[the]** **said adjacent** word lines;

forming a **second oxide layer including** tetramethylsilane (TMS) based silicon dioxide having a second dielectric constant **that is lower than said first dielectric constant** to a second thickness and to be in contact with said first silicon dioxide and **so that said TMS based silicon dioxide is also** disposed between **the side walls of** said **adjacent** word lines.

16. (Deleted) The process as defined in claim 15, wherein the dielectric constant

of said first oxide dielectric layer is higher than the dielectric constant of said TMS oxide dielectric layer.

17. (Unchanged) The process as defined in claim 15, wherein said the second thickness of said TMS based oxide is thicker than the first thickness of said first oxide layer.

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by Gill '571 at col. 5, lines 46 – 55, is used between Gill's word lines the capacitance value between the word lines will increase and will slow the memory chip read access time to data retrieval. That is an undesired degradation of memory chip performance that will cause customers not to buy the memory chip. Therefore Gill '571 teaches away from the instant invention. There is not teaching in Gill '571 for use of an oxide TMS that has lower dielectric constant between the word lines as is claimed by the instant application.

The Examiner also alleges that:

> "Okano et al. discloses using TMS in order to deposit an oxide layer (see col. 5 line 48 to col. 6-line 6). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the process of Gill et al. so as to form the oxide layer of TMS because this is shown to be suitable precursor to form stable oxide layers.".

The word "dielectric" does not appear in Okano et al. specification, title, abstract and claims of the patent. There is no information in Okano et al. to teach one of ordinary-skill-in-the-art to know the dielectric constant of the TMS oxide of Okano et al.. Okano at al. also discloses that his instrument can produce silicon nitride film (col. 10, lines 1 to 7) without disclosing the value of the dielectric constant of TMS based silicon nitride. If one speculates, one may attempt to use the Okano et al. silicon nitride that is TMS based because it may have a lower dielectric constant than that of thermal silicon dioxide. But one cannot know anything about the dielectric constant of the Okano et al. thin films that are produced by his instrument from Okano et al. '919 patent disclosure.

In fact Okano at al., col. 10, lines 35 to 36 teaches that **"a desired resistance could not**